इंटरनेट मानक

## Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 1419 (1989): Anti-fouling paint, brushing, for ship's bottoms and hulls [CHD 20: Paints, Varnishes and Related Products]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

**IS 1419 : 1989**

*Indian Standard*

# ANTIFOULING PAINT, BRUSHING, FOR SHIPS BOTTOM AND HULLS - SPECIFICATION

## *( Second Revision )*

**भारतीय मानक**

# समुद्री जहाजों की तली और ढांचे के लिए ब्रुश से करने का दुर्गन्ध रोधी रोगन — विशिष्टि

**( दूसरा पुनरीक्षण )**

---

First Reprint FEBRUARY 1992

UDC 667.637:629.12

© BIS 1990

**BUREAU OF INDIAN STANDARDS**
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*March* **1990** **Price Group 2**

Faints and Allied Products Sectional Committee, CDC 8

## FOREWORD

This Indian Standard ( Second Revision ) was adopted by the Bureau of Indian Standards on 1 May 1989, after the draft finalized by the Paints and Allied Products Sectional Committee had been approved by the Chemical Division Council.

This standard was first published in 1959 mainly to meet the naval requirements, and was revised in 1981 to cover the requirements of mercantile marine users as well. Based upon composition, two grades were introduced in that revision which still hold good. Grade 1 covers material containing minimum 40 percent of cuprous oxide and is intended to meet the requirements of the Indian Navy. It is expected that one coat of this material would prevent fouling for a period of not less than nine months. Grade 2 of the material containing a minimum of 20 percent cuprous oxide is intended to serve the requirements of mercantile navy and is expected to protect the hull against fouling for 5 to 6 months. A rapid method for evaluation of antifouling paints was included instead of normal leaching rate determination which required a period of 35 weeks.

In the present revision, two requirements of volatile matter and non-volatile binder have been introduced.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 1960 'Rules for rounding off numerical values *(revised)'*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# AMENDMENT NO. 1 APRIL 2006
# TO
# IS 1419 : 1989 ANTIFOULING PAINT, BRUSHING, FOR SHIP'S BOTTOM AND HULLS — SPECIFICATION

*( Second Revision )*

( *Page* 1, *clause* **5.3** ) — Substitute the following for the existing clause:

**'5.3 Relative Consistency**

The efflux time for the first 50 ml of the material from Flow Cup No. 4 at 30 ± 2°C, when determined as prescribed in IS 101 ( Part 1/Sec 5 ) : 1989 shall be 30 to 50 seconds.'

( *Page* 3, *Annex* A ) — Insert the following at the appropriate place:

| | | |
|---|---|---|
| 'IS 101 (Part 1/ Sec 5) : 1990 | : | Methods of sampling and test for paints, varnishes and related products : Part 1 Test on liquid paints (general and physical), Section 5 Consistency ( *third revision* )' |

( CHD 20 )

Reprography Unit, BIS, New Delhi, India

## *Indian Standard*

# ANTIFOULING PAINT, BRUSHING, FOR SHIP'S BOTTOM AND HULLS – SPECIFICATION

## *( Second Revision )*

### 1 SCOPE

**1.1** This standard prescribes requirements and methods of sampling and test for antifouling paint of red ( unspecified ) and black colour. The material is used for the protection of ship's hull including boot-topping area against the settlement of marine fouling organisms.

**1.2** This paint is applied as top coat over anti-corrosive system at every dry docking of ship.

### 2 REFERENCES

The Indian standards listed in Annex A are the necessary adjuncts to this standard.

### 3 TERMINOLOGY

**3.1** For the purpose of this standard, the definitions given in IS 1303 : 1983 and the following shall apply.

**3.1.1** *Toxicant*

Any inorganic or organic material which has got the desired solubility in sea water and ability to kill the marine fouling organisms.

**3.1.2** *Accelerated Leaching Rate*

The rate of release of toxicant ( cuprous oxide ) expressed as $\mu$g of copper/cm$^2$/day in alkaline glycine solution.

### 4 GRADES

**4.1** The material shall be of two grades, namely, Grade 1 and Grade 2, depending on its composition ( *see* **5.1** ).

### 5 REQUIREMENTS

### 5.1 Composition

**5.1.1** *Raw Materials*

The following raw materials used in the formulation of paint conforming to this specification shall be tested by relevant methods prescribed in specifications indicated against each:

a) Cuprous oxide ( IS 70 : 1980 )
b) Iron oxide ( IS 44 : 1969 )
c) Absetine ( IS 66 : 1972 )
d) Zinc oxide ( IS 35 : 1975 )

**5.1.1.1** Tinting to black shade of antifouling paint may be obtained by incorporating suitable quantities of black oxide of iron ( *see* IS 44 : 1969 ) and carbon black.

**5.1.2** *Paint Formulation*

Paint shall be formulated with suitable pigments, varnish medium, solvent, thinners and driers in suitable proportions so as to satisfy the requirements prescribed in Table 1.

### 5.2 Mass in kg/10 Litres

The mass of 10 litres of material shall be 16.0 to 16.8 kg for Grade 1 and 14.0 to 14.8 kg for Grade 2 of antifouling paint when tested as prescribed in IS 101 ( Part 1/Sec 7 ) : 1987.

### 5.3 Relative Consistency

The efflux time for the first 50 ml of the material from Flow Cup No. 4 at 27 ± 2°C, when determined as prescribed under 7.4 of IS 101 : 1964 shall be 30 to 50 seconds.

### 5.4 Accelerated Leaching Rate

When tested as prescribed in Annex B, the accelerated leaching rate shall not be less than 650 $\mu$g of copper/cm$^2$/day for a period of 72 hours in case of Grade 1 and 48 hours in case of Grade 2 of antifouling paint, respectively. After the test, film integrity shall not be lost.

**5.5** The material shall also comply with the requirements prescribed in Table 1.

### 6 PACKING AND MARKING

### 6.1 Racking

The material shall be packed in steel containers or as agreed to between the purchaser and the supplier.

### 6.2 Marking

The containers shall be marked with the following particulars:

a) Name, grade and colour of the material;
b) Manufacturer's name and his recognized trade-mark, if any;
c) Volume of the content;
d) Batch number or lot number in code or otherwise; and
e) Month and year of manufacture.

**Table 1 Requirements for Antifouling Paint, Brushing, for Skip's Bottom** and **Halls**

( *Clauses* 5.1.2, 5.5 *and* 8.1 )

| Sl No. | Characteristic | Requirement | | Method of Test, Ref to | |
|---|---|---|---|---|---|
| | | Grade 1 | Grade 2 | Indian Standard | Appendix |
| (1) | (2) | (3) | (4) | (5) | (6) |
| i) | Drying time: | | | | |
| | a) Surface dry | Not less than ½ hour | Not less than ½ hour | IS 101 ( Part 3/ Sec 1 ) : 1986 | — |
| | b) Hard dry | Not more than 8 hours | Not more than 8 hours | | |
| ii) | Finish | Smooth, semi-glossy/glossy and free from sagging or wrinkling | Smooth, semi-glossy/glossy and free from sagging or wrinkling | 7.5 of IS 101 :1964 | – |
| iii) | Pigment content. percent by mass, | 50 ± 2 | 40 ± 2 | 27 of IS 101 : 1964 | — |
| iv) | Cuprous oxide ( as $Cu_2O$ ), percent by mass of paint, *Min* | 40 | 20 | — | B* |
| v) | Volatile matter, percent by mass, *Max* | 20 | 25 | IS 101 ( Part 2/ Sec 2 ) : 1986 | – |
| vi) | Nonvolatile binder, percent by mass, *Min* | 30 | 35 | 27 of IS 101 : 1964 | — |
| vii) | Scratch hardness after 48 hours of drying | To pass the test | To pass the test | IS 101 ( Part 5/ Sec 1 ) : 1964 | — |
| viii) | Flexibility and adhesion after 48 hours of drying | No damage or detachment of film | No damage or detachment of film | IS 101 ( Part 5/ Sec 2 ) : 1964 | — |
| ix) | Flash point, °C, *Min* | 30 | 30 | IS 101 (Part 1/ Sec 6) : 1987 | — |
| x) | Keeping quality | Not less than 9 months | Not less than 9 months | 31 of IS 101 : 1964 | — |

*Separate total pigments first and then follow this method with suitable modifications to remove interfering substances, if any.

## 7 SAMPLING

Representative samples of the material shall be drawn as prescribed in IS 101 ( Part 1/Sec 1 ): 1986.

### 7.1 Number of Tests

**7.1.1** Individual samples from one lot shall be tested for mass in kilogram per 10 litres. If they are found to be uniform and conforming to this specification, the individual samples may be blended to make a composite sample.

**7.1.2** Test for remaining characteristics of the material shall be conducted on the composite sample.

### 7.2 Criteria for Conformity

The lot shall be declared as conforming to the requirements of this specification if individual samples are uniform and conform to the specification limits for mass in kilogram per 10 litres and if the characteristics tested on composite sample satisfy the corresponding requirements given in this specification.

## 8 TEST METHODS

**8.1** Tests shall be conducted as prescribed in col 5 and 6 of Table 1.

### 8.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

# ANNEX A

( *Clause* 2.1 )

## LIST OF REFERRED INDIAN STANDARDS

| *IS No.* | *Title* | *IS No.* | *Title* |
|---|---|---|---|
| IS 35:1975 | Zinc oxide for paints *( first revision )* | is 44 : 1969 | Iron oxide pigments for paints (*first revision* ) |
| IS 40 : 1971 | Carbon black for paints *( first revision )* | IS 66 : 1972 | Magnesium silicate pigments for paints *(first revision* ) |

| *IS No.* | *Title* |
|---|---|
| IS 70 : 1980 | Cuprous oxide for paints ( *first revision )* |
| IS 101 : 1964 | Methods of test for ready mixed paints and enamels ( *second revision* ) |
| IS 101 ( Part 1/ Sec 1 ) : 1986 | Methods of sampling and test for paints, varnishes and related products : Part 1 Test on liquid paints ( general and physical ), Section 1 Sampling ( *third revision* ) |
| IS 101 (Part 1/ Sec 6 ) : 1987 | Methods of sampling and test for paints, varnishes and related products: Part 1 Test on liquid paints ( general and physical ), Section 6 Flash paint ( *third revision )* |
| IS 101 ( Part 1/ Sec 7 ) : 1987 | Methods of sampling and test for paints, varnishes and related products : Part 1 Test on liquid paints ( general and physical), Section 7 Mass per ten litres ( *third revision* ) |
| IS 101 ( Part 2/ Sec 2 ): 1986 | Methods of sampling and test for paints, varnishes and related products: Part 2 Test on liquid paints ( chemical examination ), Section 2 Volatile matter ( *third revision* ) |
| IS 101 ( Part 3/ Sec 1 ) : 1986 | Methods of sampling and test for paints, varnishes and related products : Part 3 Tests on paint film formation, Section 1 prying time ( *third revision* ) |
| IS 101 ( Part 5/ Sec 1 ) : 1988 | Methods of sampling and test for points, varnishes and related products: Part 5 Mechanical test on paint films, Section 1 Hardness tests ( *third revision )* |
| IS 101 ( Part 5/ Sec 2 ) : 1988 | Methods of sampling and test for paints, varnishes and related products: Part 5 Mechanical test on paint films, Section 2 Flexibility and adhesion ( *third revision* ) |
| IS 376 : 1986 | Sodium hydroxide, analytical reagent ( *third revision )* |
| IS 1303 : 1983 | Glossary of terms relating to paints ( *second revision* ) |
| IS 4408 : 1979 | Sodium chloride, analytical reagent *( first revision* ) |

## ANNEX B

( *Clause* 5.4 )

## DETERMINATION OF ACCELERATED LEACHING RATE

### B-1 GENERAL

**B-1.1** The release of copper from the antifouling paint film is accelerated in sodium glycinate solution. It has been established on the basis of extensive work carried out that for compositions stipulated in this specification, the leaching rate of copper from the film is enhanced by a factor of 65. This enables the assessment of leaching behaviour of antifouling paint in a period of maximum 72 hours.

### B-2 ACCELERATED LEACHING RATE APPARATUS

**B-2.1** The apparatus consists of 200 watt electric motor mounted on a base platform. This motor is connected to a shaft through reduction gear assembly. This shaft with the help of gear arrangement rotates six bakelite panels clamped on either side at a speed of 60 rev/min. A metal plateform having glass container holders is provided below the panel clamps assembly. The platform can be moved up and down on worm gear for replacement of containers.

### B-3 REAGENTS

**B-3.1 Sodium Hydroxide** ( *See* IS 376 : 1986 ).

**B-3.2 Glycine**

**B-3.3 Sodium Chloride ( *See* IS 4408 : 1979 ).**

**B-3.4 Leaching Solution**

Dissolve 1875 g of glycine and 28 g of sodium chloride in water. Add 5 ml of 1.25 N sodium hydroxide solution and make the volume to one litre. The *p*H of the solution shall be 9.0.

**B-3.5 Sodium Glycinate Solution**

Dissolve 112.60 g of glycine in 250 ml of 6 N sodium hydroxide solution and make up to one litre.

### B-4 PROCEDURE

**B-4.1** Roughen perspex panels ( 14.5 cm × 5.0 cm × 0.3 cm ) having two notches at the top with emery paper ( No. 0 ) and coat with wash primer to cover an area of 10 cm × 5 cm on either side. After two hours of drying of wash primer, apply antifouling paint to give a dry film mass of 0.01 to 0.015 g/cm$^2$. Allow the painted panels to dry for 24 hours and seal the edges with paraffin wax. Fix the panels into the panel holders of accelerated leaching rate apparatus. Rotate the panels in 500 ml of leaching solution in glass containers. Replace leachate with fresh solution at the end of every 8 hours.

**B-4.2 Determination of Copper**

Transfer 25 ml of leachate to a 50ml volumetric flask. Make up the volume by adding sodium glycinate solution. Mix well and transfer the requisite quantity into a glass cell and measure the optical density by spectrophotometer/colorimeter at wave length 630 nm. Run the blank along with the experiment.

### B-5 CALCULATION

**B-5.1** Determine the copper in solution with the help of calibration curve obtained in Annex C using known quantities of copper.

**B-5.2** From the amount of copper in 500 ml of leachate, calculate leaching rate as µg of copper/cm$^2$/day as given below:

$$\text{Leaching rate} = \frac{3X}{100}$$

where

$X$ = amount of minimum copper in micrograms in 500 ml of leachate after any continuous 8 hours of leaching.

## ANNEX C

( *Clause* B-5.1 )

### METHOD FOR PREPARATION OF CALIBRATION GRAPH FOR COPPER

### C-1 APPARATUS

**C-1.1** Any suitable spectrophotometer/colorimeter capable to get wavelength of 630 nm.

### C-2 REAGENTS

**C-2.1 Stock Solution**

Weigh accurately 500 mg of pure copper and dissolve it in 10 ml of 1:1 nitric acid. Boil to remove nitric acid fumes. Add a few drops of concentrated sulphuric acid. Heat for some time till white fumes are evolved. Transfer to a 100-ml volumetric flask and make up the volume with distilled water. One millilitre of this solution contains 5 mg of copper.

**C-2.2 Sodium Glycinate solution ( 1.5 N )**

Weigh 112.605 g glycine and add 250 ml 6N sodium hydroxide. Dilute with distilled water to one litre.

**C-2.3 Sodium Hydroxide Solution**

**C-2.4 Glycine Solution, *p*H 9**

### C-3 PROCEDURE

**C-3.1 Standard Solution**

Place 10 ml of stock solution in a 100 ml volumetric flask. Add about 2 ml of strong sodium hydroxide solution till precipitate appears. To this, add about 2.0 ml of 1.5 N sodium glycinate solution to disolve the precipitate. Dilute to 100 ml with glycine solution ( leaching solution ).

**C-3.2** Place one millilitre of the standard solution in 50 ml volumetric flask containing 25 ml of 1.5 ml sodium glycinate. Make up to 50 ml volume by adding appropriate amount of glycine solution. One millilitre of this solution contains 10 µg of copper.

**C-3.3** Determine the optical density of the solution using a suitable colorimeter at 630 nm.

**C-3.4** Repeat the experiment with 2, 3 and 4 up to 20 ml and record the readings.

**C-3.5** Prepare the calibration graph by plotting optical density against concentration of copper solution in µg.

**Standard Mark**

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a farther safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

### Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardisation, marking and quality Certification of goods and attending to connected matters in the country.

### Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copy tight be addressed to the Director ( Publication ), BIS.

### Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference :

Doc:No. CDC 8 (9457)

**Amendments Issued Since Publication**

| Amend No. | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
| | | |

**BUREAU OF INDIAN STANDARDS**

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 331 01 31, 331 13 75
Telegrams : Manaksanstha
( Common to all Offices )

| Regional Offices: | | Telephone |
|---|---|---|
| Central: | Manak Bhavan, 9 Bahadur Shah Zafar Marg<br>NEW DELHI 110002 | 331 01 31<br>331 13 75 |
| Eastern : | 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola<br>CALCUTTA 700054 | 37 86 62 |
| Northern : | SCO 445-446, Sector 35-C, CHANDIGARH 160036 | 53 38 43 |
| Southern : | C.I.T. Campus, IV Cross Road, MADRAS 600113 | 235 02 16 |
| Western : | Manakalaya, E9 MIDC, Marol, Andheri ( East)<br>BOMBAY 400093 | 6 32 92 95 |

Branches: AHMADABAD, BANGALORE. BHOPAL. BHUBANESHWAR.
COIMBATORE FARIDABAD. GHAZIABAD. GUWAHATI.
HYDERABAD. JAIPUR. KANPUR. PATNA. THIRUVANANTHAPURAM.

Reprography Unit, BIS, New Delhi, India